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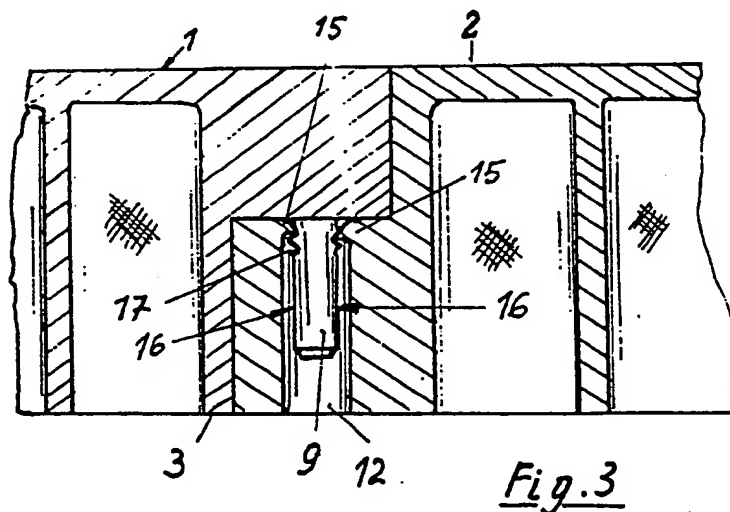
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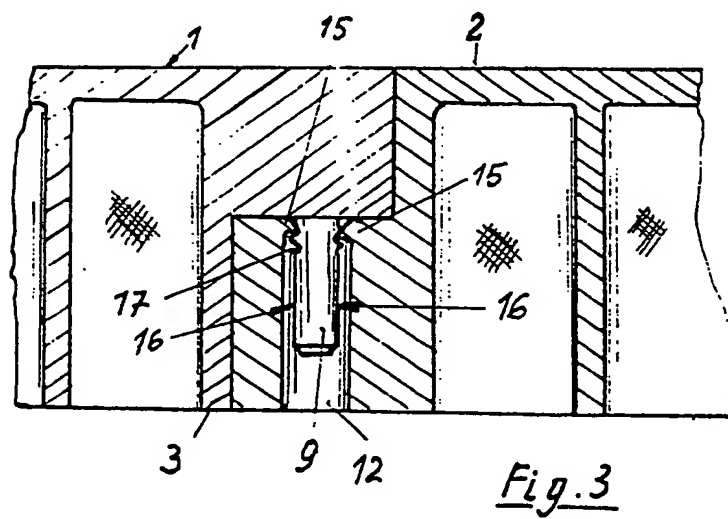
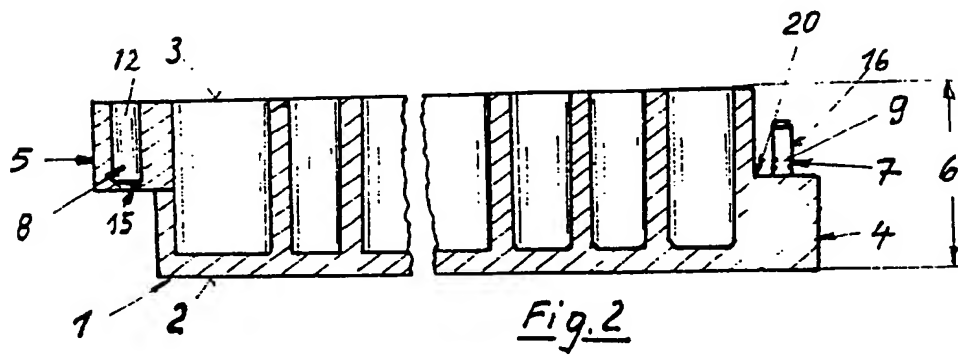
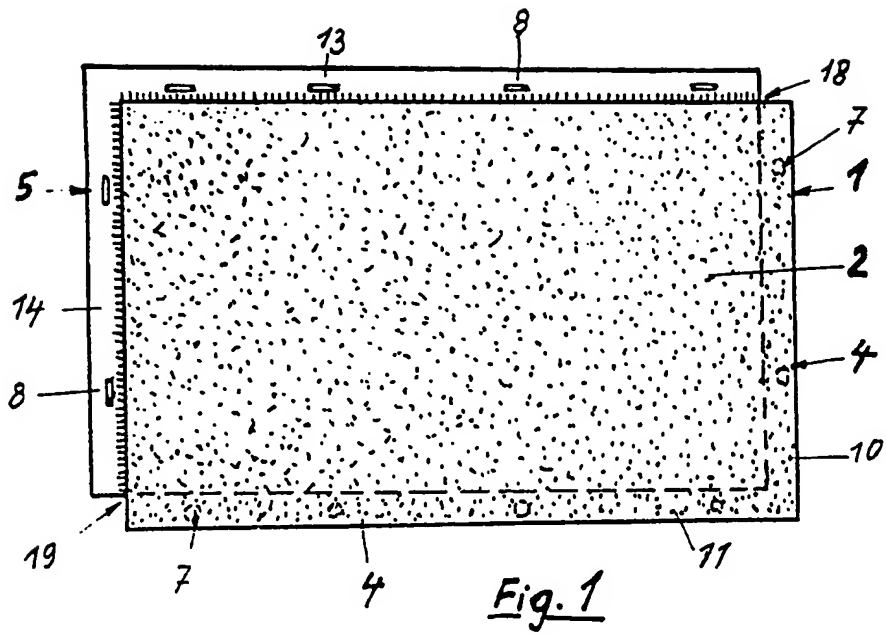
(54) **Two-sided reversible grid plate of plastic**

(57) The grid plate (1) has an upper side (2) and an underside (3) which can be reversibly laid as desired as a tread surface. The side walls of the grid plate (1) are designed as connecting strips and carry connecting elements in the form of eyes (12) and pins (9) which engage one into the other. The eyes (12) have in the direction towards the overlapping plane a tapered lip-shaped edge (15). The diameter of the pins (9) is designed to be to some extent greater than the internal diameter of the eyes (12) so that the pins (9) having entered the eyes (12) are held in the predetermined position by self-locking.



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Two-sided reversible grip plate of plastic

The present invention relates to a two-sided reversible grid plate of plastic, particularly but not exclusively of a recycled plastics material, with a rough anti-slip upper side and a rib-reinforced underside, which grid plate can be laid as a securing elements for parking areas, street benches, embankment slopes et al, as desired with the upper and/or the underside as tread area, with overlapping connection strips swaged on the sides of the grid plate, disposed inside the distance from the upper to the underside, and fitted with connecting elements. Such grid plates will hereinafter be referred to as "of the type described".

EU-PS 0 117 707/A3 discloses a grid plate for securing the group in which the sides are designed as connection strips. These connection strips carry connecting elements in the form of eyes into which mushroom-shaped dowels of a new grid plate to be laid engage. The eyes are designed cylindrical in cross-section. The connection strip carrying the mushroom-shaped dowels is swaged on the upper side of the tread and lies with the latter in the same plane, while the two other sides at an angle to each other are turned downwards and form the connecting strip provided with eyes.

The press mould for such a grid plate is complicated to produce as the mushroom-shaped dowels do not lend themselves to longitudinal deformation. Already one single mushroom-shaped dowel creates difficulties on demoulding as the mould has to be divided into parts and is thus more expensive. In the case of an arrangement in rows of mushroom-shaped dowels a press mould becomes complicated to such an extent that rational production is found to be impossible.

In addition, the distance between dowels must correspond exactly to the distance between eyes, as

otherwise the mutual engagement of these connection elements would not be possible. The internal passage of the eyes is cylindrical and therefore, also, the measurement from dowel to dowel is dependent upon the measurement from eye to eye and must correspond exactly with this. Particularly, in the case of larger grid plates, it is not always possible to retain this exact distance as a consequence of differences of contraction on cooling, so that it is not possible to avoid fairly large quantities of rejected plates and manufacture becomes uneconomic.

The present invention seeks to produce a grid plate which can be laid with the possibility of using both the top and the bottom sides as tread surface, said grid plate being of easy and rational manufacture and easy to demould. Also, with such a plate, any alterations in the distances between connection elements brought about by differences of contraction when the demoulded grid plates cool down have no negative effects when assembling the plates or as regards the holding together without play of grid plates which have been laid in place.

According to the present invention there is provided a two-sided reversible grid plate of plastics material, of the type described, wherein the connecting elements on the one hand, comprise cylindrical dowels or pins with parallel flattened sides, the flattened areas lying in the direction towards the sides contacting at an angle, and, on the other hand, consist of at least respectively one eye comprising a longitudinal hole, the sides of the longitudinal holes being disposed parallel with the other two contacting sides, the eyes having towards the overlapping plane a tapered lip-shaped edge, and the cylindrical pin or dowel, with respect to its or their diameter or the distance between the two flattened sides is/are designed to be greater than the distance between the parallel longitudinal hole sides of the eye.

As a result of the fact that the connection elements are, on the one hand, designed as cylindrical

pins which are easy to demould longitudinally, the press tool is considerably simplified. On the other hand, the eyes are designed as longitudinal holes, the sides of these longitudinal holes being disposed parallel with the contacting sides. As a result no difficulties are encountered with respect to the insertion of the dowels into the longitudinal eye holes even when there are changes of distance between connection elements brought about by contraction during the cooling of demoulded grid plates. On the insertion of the dowels into the narrowed lip-shaped edge of the eye, the thin edge layer of the latter is taken along by the dowel thicker in diameter in the direction of insertion and holds the dowel in the desired predetermined position by self-locking the pins or dowels may be designed with parallel mutually flattened sides. The surface of attack of the bent lip-shaped edge of the longitudinal hole sides and of the dowel sides lying parallel is thereby enlarged and therefore self-locking is also increased. A loosening of the grid plates after they have been laid is reliably prevented by the self-locking, as this may be adjusted on the loading itself. The two connection strips are furthermore rigidly secured in the overlap area so that a smooth even tread area is obtained. The same end is also achieved when the grid plates are laid with the underside as tread surface.

Finally, the connection strips can run respectively into the extension of the rib sides or with the upper side of the tread surface. Thereby there is obtained the required recess that is necessary to enable the connecting strips to be applied on the longitudinal holes without any gaps.

There may also be provided on the flattened sides of the dowels flat notches which come within the scope of the contraction. These flat notches serve for a better supporting of the bent edge of the longitudinal hole and thereby increase the self-locking of the connection elements.

The invention will be explained by way of example with reference to the accompanying drawing in which:-

Fig. 1 is a top view of an embodiment of a grid plate in conformity with the invention,

Fig. 2 is a cross-section through a grid plate, and

Fig. 3 is a hooked-in pin or dowel inserted in a longitudinal eye hole on a larger scale.

The grid plate 1 shown in the drawings has on the upper side 2 a rough, non-slip surface, while the underside 3 is reinforced by means of ribs. The ribs may run diagonally or at right angles to the grid plate, forming so-called nodal points. By this means a great stability of the grid plate 1 is achieved. Ribbing also serves for better keying on the ground.

For the connection of a grid plate with the adjacent ones connection strips 4 and 5 have been swaged, carrying the actual connecting elements 7 and 8. The connecting strip 4 is kept at the same height as the tread surface, here the upper side 2; it is therefore swaged on this without graduation and carries the downwardly directed pins 9. The connecting strip 4 is formed by the two sides 10 and 11 contacting at an angle.

The pins 9 may be designed circular in cross section; however, they may also be flattened on the two sides 16 which extend parallel with the sides 10 and 11. Engagement is effected by means of the lip-shaped edge 15 of the eyes designed as longitudinal holes. The thickness of the pins from flattened portion to flattened portion is to some extent maintained greater than the inside diameter of the eye 12. There applies here the distance between the two parallel sides of the longitudinal eye hole 12.

The connection strip 5 which has the longitudinal eye holes 12 is designed flush with the underside 3 and is formed of the other two sides 13 and 14 contacting at an angle. The connection strip 5 protrudes step wise from the tread surface. The two ends 18 and 19 of the connecting strip 5 are shortened and end in the extension

of the edge 20, i.e., they are shorter by the width of the connecting strip 5 (Fig. 1). The height of the connecting strips 4 and 5 when the grid plates are laid is equal to, or smaller than, the overall height of the grid plate 1, the underside of the connecting strip 4 lying as a close fit on the upper side of the connecting strip 5. The pins 9 of the connecting strip 5 may have on the flattened areas 16 notches or grooves which are arranged in particular in the deposition area on the connecting strips 5. The eyes 12, designed preferably as longitudinal holes, extend slantwise upwards towards the upper side of the connecting strip 5 and form together with this a tapered lip-shaped edge 15.

On pushing the pins 9 into the eyes 12 which, in the internal diameter, are designed to be smaller than the width of the flattened parallel sides of the pins 9, the flexible lip-shaped edge is slightly moved along in the insertion direction and applies with restoring force slantwise on both sides of the pin 9, as a result of which there is effected a self-locking against the pulling out of the pins. If at this spot notches or grooves 17 are provided, the self-locking against the pulling out of the pins 9 can be strengthened as a result. The grid plate may, as desired, be laid also with the underside 3 as a tread surface.

With this manner of laying there arise no faulty areas in the tread picture. If the grid plates 1 are to be laid alternately with the upper side 2 and the underside 3, the connection of one grid plate with another may be effected by means of a corresponding adapter strip which exhibits on the one longitudinal side pins 9 and on the other longitudinal side the eyes 12 in longitudinal hole form. In this arrangement the grid plate 1 is to be laid in such a way that the pins 9 of the connecting strip 4 point upwards. Two-sided reversible grid plate of plastic, particularly recycled plastic material.

CLAIMS:

1. A two-sided reversible grid plate of plastics material, of the type described, wherein the connecting elements on the one hand, comprise cylindrical dowels or pins with parallel flattened sides, the flattened areas lying in the direction towards the sides contacting at an angle, and, on the other hand, consist of at least respectively one eye comprising a longitudinal hole, the sides of the longitudinal holes being disposed parallel with the other two contacting sides, the eyes having towards the overlapping plane a tapered lip-shaped edge, and the cylindrical pin or dowel, with respect to its or their diameter or the distance between the two flattened sides is/are designed to be greater than the distance between the parallel longitudinal hole sides of the eye.
2. A grid plate according to claim 1, wherein the connection strips respectively run into the extension of the sides.
3. A two-sided reversible grid plate of plastics material, substantially as described herein with reference to, and as illustrated in, the accompanying drawings.